

the tissue of the nourishing root is established by a simple layer of cells forming the inferior surface of the papilla.

Osyris presents, both in its adult rhizomes and its stems, a pith, medullary rays, and bundles of liber-fibres, which are absent from the roots. There is not, however, that difference between the rhizomes and the stems which M. Chatin supposed he found, doubtless because he examined only rhizomes of the year at the commencement of their evolution. The author could find no true tracheæ in these organs. All the wood-cells, as well as those of the medullary parenchyma, are riddled with pits.

The intimate affinity connecting all the Santalaceæ would lead to the supposition that most, if not all, the types of this group, are parasites. The same may be said of the true Olacineæ (*Olax*, *Ximenia*, *Heisteria*, *Liriosma*, *Opilia*, &c.), which scarcely differ from the Santalaceæ. The black colour assumed by most of these plants on drying, and their absence from gardens, plead in favour of this idea.

Dr. Planchon regrets that he has hitherto been unable to trace the phænomena of germination either in *Osyris* or *Santalum*. This study, which he proposes to make at the proper season, will enable him to settle beyond doubt in what degree these plants are parasitical. Do they take part of their nourishment from the soil? Do all their radical fibres produce suckers? What is the duration of the suckers? A prolonged study is required for the solution of all these questions. It may be stated meanwhile, that the subjects attacked by *Osyris* do not appear to suffer much from its presence, and fulfil as usual the vegetative and reproductive functions.

XXVI.—*On some Sections of the Upper Lias recently exposed at Nailsworth, Gloucestershire.* By JOHN LYCETT*.

So few opportunities are afforded for examining the Upper Lias of the Cotteswolds, so small are the artificial exposures of the stage occasionally made, so limited their extent and depth, that its fossils are almost unknown, and even the thickness of the stage has been very variously estimated. During the author's experience of more than twenty years, the Upper Lias has only been known to him by small sections in clay-beds used for brick-making, and these are usually quite destitute of fossils; some cuttings, therefore, recently made, which exposed the entire thickness of the stage and many of its fossils, have induced him to prepare the present brief notice.

* Presented to the Cotteswolds Naturalists' Club, July 21, 1858.

The only authorities for the Upper Lias of the district are— ‘Outlines of the Geology of England’ by Conybeare and Phillips, 1822; ‘Outline of the Geology of the Neighbourhood of Cheltenham,’ by Sir R. I. Murchison, 1834; the enlarged edition of the latter work by J. Buckman and H. E. Strickland, 1845; ‘Memoirs of the Geological Survey of Great Britain;’ ‘The Geology of the Country around Cheltenham,’ by E. Hull, Esq., 1857. In the first of these works the Upper Lias is only distinguished from the other members of the same formation by a useful section given at page 252, exhibiting the succession in the beds upon the western slope of the Cotteswolds at Painswick Hill, by the late Mr. Halifax of Standish; but their thickness is not given. The following is the section, to which figures are here added to mark the superior divisions:—

Inferior Oolite	1
Very micaceous sand	2
Sand, with beds of unctuous, slaty, bluish clay	3
Blue clay with septaria.....	4
Thin beds of grey Lias-like marlstone.....	5
Lenticular balls of indurated marl with Ammonites and parts of Fishes	6
Marly sandstone, a yellowish-brown sandstone, spangled with mica, blue at the heart, abounding with large Belemnites, Pectens, &c.....	7
Marl and clay	8
Clay, with veins of foxy earth containing ferruginous nodules concentrically formed round a nucleus of Lias.....	9
Lias.....	10

1. The lower portion of the Inferior Oolite; thick beds of coarse, calcareous, shelly gritstone, more or less tinged with oxide of iron.

2. The sands of the Cynocephala-stage, with a shelly band at the top, some flaggy argillaceous sandstones in the middle, and a shelly band at the bottom.

- 3, 4, 5, 6. Upper Lias ; no fossils visible in this section.
 7. Marlstone or Middle Lias.
 8, 9, 10. Lower Lias ; but little exposed.

In Sir R. I. Murchison's little sketch of the 'Geology of Cheltenham,' the thickness of the Upper Lias is estimated at 60 or 70 feet ; and the following fossils were collected by him from a road-side cutting near Sandywell Park :—*Ammonites bifrons*, *A. undulatus*, *A. annulatus*, *Belemnites acutus*, *B. tubularis*, *B. penicillatus*, *Inoceramus dubius*, *Plicatula spinosa*, *Trochus bisectus*, *Arca*, *Gervillia*, *Lucina*, ?*Modiola*, *Nucula*, *Nautilus*, *Pholadomya*. In the second and enlarged edition of the same work, the authors estimate the general thickness of the Upper Lias at 100 feet ; to the fossils given in the former edition are added the following :—*Ammonites falcifer*, *A. Strangwaysii*, *Belemnites Bruguerianus*, *Trochus bisertus*, *Nucula rostralis*, *Æschna Brodiei*, *Astacus*, *Hippolita*, *Cidaris minuta*. In the memoir by Mr. Hull, the Upper Lias is stated to be upwards of 230 feet thick at Leckhampton Hill ; it is estimated to be 300 feet at Cleeve Cloud ; in the hills further northwards, at from 80 to 100 feet ; it constantly declines in thickness towards the Oxfordshire boundary of the county, so that at Burford its thickness is only 6 feet. In the southern portion of the Cotswolds it is stated to be only 10 feet thick at Wootton-under-Edge, and about 30 feet at Stroud ; but I shall have to show that at Nailsworth, a spot situated between the two latter places, the thickness of the Upper Lias is upwards of 105 feet. The only additional fossils mentioned by Mr. Hull are *Nautilus inornatus* and *Belemnites abbreviatus*.

The sections upon which the present remarks are founded were made in forming several deep drains and a cutting for a carriage-drive upon a steep hill-side preparatory to building a villa and laying out the surrounding ground for ornamental purposes, upon the western side of the valley, and immediately adjoining the village of Nailsworth ; it also happened about the same time that a cutting was made along the whole course of the turnpike road in the same valley, towards Stroud, for the purpose of laying down gas-pipes ; another small section was also afforded by some alterations made in the mill-stream at Holcomb Mills, about half a mile higher up the valley. The deep-drain sections afforded a view of the higher beds of the stage, even to their junction with the micaceous marly sands of the *Cynocephala*-stage ; the other cuttings exposed the lower beds, but less perfectly than the upper ones, and also some portion of the Marlstone series. But although a portion of nearly the whole of the beds was uncovered, the entire area from which

fossils could be procured was very inconsiderable. In descending order occurred—

* Several feet of blue clay, with intercalated thin layers of dark-coloured shale.

A thin stratum of grey, finely laminated shale, with clusters of valves of *Posidonia Bronnii*.

Brown and blue clays and marly bands containing some irregular layers of hard shale, and of thin bands of blue argillaceous limestone.

Fossils were moderately abundant in the bands of limestone. *Ammonites bifrons* was the most conspicuous; *A. communis* was in much smaller numbers; the few other Ammonites obtained consisted of *A. falcifer*, *A. heterophyllus*, *A. cornucopiae*, *A. crassus*, *A. Lythensis*, *A. Jurensis*, and a new species near to *A. Humphriesianus*; a few fragments occurred apparently of *Nautilus sinuatus*, and a single specimen of *N. latidorsatus*. *Belemnites* were comparatively few, as were also Gasteropoda and Conchifera; the latter included two undescribed species, one of *Tancredia* and one of *Placunopsis*.

In the lower beds bluish-grey clays predominated; but the sections were insufficient to expose an unbroken sequence of the lower beds, although the entire thickness of the stage was ascertained with a near approach to accuracy; the measurement gave a thickness of 105 feet, the beds being free from disturbance. Some few layers of limestone nodules occurred, but their amount was not comparable with those obtained from the Upper Lias of Somersetshire. To the same general deficiency of lime, as exemplified in the paucity and thinness of the limestone bands, may probably be attributed the general scarcity of fossils when compared with the Upper Lias of Somerset; here the chief mass of the deposit consisted of brown and blue clays which were quite destitute of fossils; no remains of Saurians or of Fishes were observed. These conditions present a remarkable contrast to the same stage at Ilminster, with its pale yellow limestone charged with Saurians, Fishes, and a multitude of Mollusca of all classes, numbering probably more than 150 species, notwithstanding that the entire thickness of the stage is only a few feet at that place. To study these, the extensive collection of Mr. Moore, in the Bath Museum, should be visited.

The occurrence at Nailsworth of finely laminated shales with the little *Posidonia Bronnii* in the upper portion is interesting, as identifying the stratum with the continental representative of the same shale: this fragile bivalve appears to be limited to the single stratum indicated.

The large *Tancredia* is the first recorded example in the Lias

of England, although upwards of eleven species are distributed throughout our Lower and Upper Oolites; in France and Germany, on the other hand, nearly all the recorded species are Liassic. It is probable, however, that some, or even all of the shells referred to *Tellina* in the "Etage Bathonien" of D'Orbigny belong to the genus *Tancredia*, excluding the two species in his "Etage Bajocien," which belong to the genus *Quenstedtia*.

The following is the limited list of Upper Lias Testacea procured at Nailsworth:—

Cephalopoda.

- Ammonites bifrons, *Brug.*
- falcifer, *Sow.*
- communis, *Sow.*
- heterophyllus, *Sow.*
- cornucopiæ, *Y. & B.*
- Jurensis, *D'Orb.*
- Lythensis, *Y. & B.*
- crassus, *Phil.*
- annulatus, *Sow.*
- Ilminstrensis, n. sp.
- Belemnites compressus, *Voltz.*
- tripartitus.
- Nautilus latidorsatus, *D'Orb.*
- sinuatus, *Sow.*

Gasteropoda.

- Pleurotomaria.
- Turbo capitaneus, *Münst.*
- Conchifera.**
- Astarte lurida, *Sow.*
- Lucina?
- Tancredia læviuscula, n. sp.
- Posidonia Bronnii, *Münst.*
- Placunopsis sparsicostatus, n. sp.
- Nucula Hausmanni, *Ræm.*
- Pecten.
- Gresslya gregaria, *Ræm.* sp. (G. Anglica, *Ag.*)
- Lima gigantea, *Sow.*
- bellula, *Mor. & Lyc.*

Notes on the Testacea.

Ammonites bifrons. A variety with compressed sides, in which the falciform ribs are but little prominent. A few examples occurred of the ultimate condition of growth, in which state it may readily be mistaken for a distinct species, and probably constitutes the *A. Hildensis* of Simpson. The costæ have disappeared upon the whole of the last volution, which presents only densely arranged fine falciform lines which pass over the back and the keel; the lateral sulcation has become indistinct through the flattening of the sides of the volution; the back has lost its rectangular figure and become rounded, sloping obliquely upon each side from the keel, and the two dorsal grooves have disappeared; the keel itself has become more elevated and conspicuous. The inner or smooth portion of each volution overlaps and conceals the costated portion of the preceding volution, so that the entire aspect of the shell is smooth, and it is only by breaking away a portion of the last volution near to the suture that the ribs of the next volution can be exposed and the identity of the species proved. It occurred abundantly.

A. communis. Specimens were indifferently preserved, but exhibited some of those varieties in the arrangement of the dorsal ribs, and in the general figure, which perplex collectors who

desire to separate them into the forms named *A. communis*, *A. Hollandrei*, and *A. Braunianus*,—a perplexity which is in no degree lessened by the study of numerous specimens. Further investigations into these forms are desirable.

A. heterophyllus. Badly preserved examples, and few.

A. cornucopie (*A. fimbriatus*, Sow.). A single fine example in one of the higher beds. Some casts of young forms, apparently of this species, have been procured in the lower zone of the *Cynocephala*-stage at Nailsworth.

A. Jurensis. Fragments only in the higher beds.

A. crassus (*A. Raquinianus*, D'Orb.). Evidently the same shell as in the lower zone of the *Cynocephala*-stage at Nailsworth and in the Upper Lias of Yorkshire.

Ammonites Ilminstrensis, n. sp.

In its general figure it is scarcely to be distinguished from *Ammonites Humphriesianus*; the style of its ornamentation is also very similar to that of the latter species; there are, however, some well-marked differences. In *A. Humphriesianus* the lateral costæ form, with the dorsal, a curvature more or less marked; in the Lias shell, the ribs pass from the suture straight over the sides and back. Usually two, but sometimes three, dorsal ribs unite with one lateral rib. In *A. Humphriesianus* the number of dorsal ribs is somewhat greater; but the most conspicuous distinction consists in the form of the dorsal ribs, which in the Lias shell are much more narrow, elevated, and acute, so that there is a wide space left between each rib. In the young shell the lateral ribs are likewise much elevated and acute, so that they are little larger than the dorsal ribs; there is also some little distinction in the figure of the volutions, and consequently of the aperture, the portion near to the suture overhanging the preceding volution more than in the Inferior Oolite shell.

The septa consist of three large principal lobes, much produced, and of two small accessory lobes. The dorsal lobe is much lengthened, with a single, terminal, very elongated and pointed digitation upon each side of the mesial line; there are two smaller lateral digitations; all the digitations are indented. The superior lateral lobe has its termination trifurcate, the mesial digitation being pointed, and of immense length; but the lobe altogether is less lengthened than the dorsal lobe. The inferior lateral lobe is similar in figure to the superior lobe, but is much smaller and shorter. The two accessory lobes are very small and simple, the second being nearly concealed by the convexity near to the suture. The dorsal saddle is of great width, consisting of two principal divisions, of which the outer is much the larger;

each division has two principal branches with numerous indentures. The lateral saddle has two principal portions, of which the outer is the smaller; the indentures are smaller and less conspicuous than in the dorsal saddle. The accessory saddles are small and simple, almost without indentures.

Ill-preserved specimens occurred rather abundantly at Holcomb, associated with *A. bifrons* and *Astarte lurida*. My friend Mr. Moore has favoured me with fine specimens from the pale-yellow bed of the Upper Lias at Ilminster, and smaller forms of the same species occur in the lower shelly zone of the Cynocephala-stage at Nailsworth. The largest specimen in my possession has a diameter of $2\frac{1}{4}$ inches; the height of the aperture is 6 lines, the opposite diameter 10 lines.

A. falcifer. A few specimens. At Stroud, when the railway was being constructed, a thin band of pale grey limestone was crowded with fine specimens, to the exclusion of all other species.

A. annulatus, Sow. Few, and ill-preserved.

A. Lythensis, Y. & B. Smaller forms than occur at Whitby. It is not the *A. Lythensis* of Quenstedt; the latter is a very different Ammonite.

Belemnites compressus, Voltz. Large specimens in the upper bed, associated with *B. tripartitus*.

B. tripartitus, Schl., agrees with specimens in the Cynocephala-stage at Nailsworth and at Frocester Hill.

Nautilus latidorsatus, D'Orb. (*N. Toarcensis*, D'Orb.; *N. Jurensis*, Quenst.). A single fine specimen.

N. sinuatus, Sow. Fragments only.

Pleurotomaria. Species undetermined, with elevated spire, narrow convex volutions, mesial siphonal rib, and fine, densely arranged, equal encircling lines.

Turbo capitaneus, Müntz. Its aspect agrees with specimens from the Cynocephala-stage in the neatness of the ornamentation.

Gresslya gregaria, Rœm. A large tumid species, well separated from congeneric forms. A single specimen.

Tancredia leviuscula, n. sp.

A large elongated species, with an oblique dorsal angle and the posterior border nearly closed. Compared with allied forms, it is more lengthened and less convex than *T. donaciformis*; the anterior extremity is more rounded; the umbo is but little elevated, the posterior side being much extended and its extremity pointed; the height being only equal to $\frac{6}{10}$ ths of the length. It is distinguished by the same features from *T. Deshayesea* and *T. compressa*. A single fine specimen.

Lima gigantea, Sow. This well-known shell occurs both in the Lower and Upper Lias of Gloucestershire. D'Orbigny has separated the older form under the name of *L. edulis*. I do not perceive that the latter possesses any sufficient specific distinction.

Lima bellula, Mor. & Lyc. Delicately preserved, and exhibiting the finely ornamented surface, which is rarely seen in Inferior Oolite specimens. Some of the latter attain larger dimensions and have a somewhat shorter figure, but do not possess any other distinguishing feature.

Placunopsis sparsicostatus, n. sp.

Shell flattened, suborbicular, oblique; umbo raised, submarginal, the surface with numerous irregular, unequal, concentric plications, and a few raised, equal, linear, distant, undulating and radiating ribs, sometimes slightly knotted where they pass over the plications. Diameter 12 lines. A single good specimen.

Nucula Hausmanni, Rœm. Nearly allied to *Nucula Erato*, D'Orbigny, an Inferior Oolite shell both of Yorkshire and Gloucestershire; but the latter species is less angular, less pointed at the extremities, or more ovate and smaller. A single fine specimen.

Posidonia Bronnii, Münt. A delicate papyraceous and somewhat irregular shell, usually indifferently preserved, but occurring throughout a thickness of about two inches in tender, thinly laminated shale. Impressions are abundant, but the test is rarely preserved.

Astarte lurida, Sow. So numerous are the Jurassic species of *Astarte*, and in many instances so nearly allied are they to each other, that the utmost care and precision is necessary, both in descriptions and figures, to convey clear and correct ideas of them in the absence of the fossils; nor under any circumstances can the varieties of aspect which they assume, and the boundaries between species, be in every instance sufficiently defined. The figure of *Astarte lurida* in the 'Min. Conch.' accurately represents a short specimen in the young state, before the arrests of growth had produced irregularity and inequality in the encircling ribs, the verbal description appended being very concise. The following description is the result of an examination of a multitude of specimens in every stage of growth:—

Shell oblique, ovate, moderately convex; umbones anterior, pointed, and incurved; anterior side very short; lunule large, striated, elliptical, excavated, its margin slightly rounded; ligamental margin lengthened, its outline somewhat curved, forming with the other valve a lengthened, smooth, but not deeply exca-

vated area with acute borders; lower margin elliptically curved, internally crenulated. Surface with elliptical costæ, regular in the young shell, subsequently degenerating into irregular and unequal elevations, more especially when the surface exhibits arrests of growth; the costæ are not much raised, rounded, and fully equal in breadth to the interstitial spaces (about thirty-two in a full-grown specimen); the entire surface has fine striations, which follow the direction of the costæ.

Specimens vary much in their length and obliquity; but none are comparable to the Oxford Clay shell figured in the 'Illustrations of the Geology of Yorkshire' under the name of *Astarte lurida*: the large anterior side and the small lunule mark the latter as a distinct species.

Several examples of *Astarte lurida* were obtained in the upper portion of the Upper Lias in a mill-stream cutting at Holcomb; it has also occurred very abundantly a little higher in the geological scale, in the lower zone of the Cynocephala-stage at Nailsworth. D'Orbigny ('Prodrôme') places it in his "Étage Bajocien," which is probably an error; the English localities cited by him (Fox Hill and Taunton) are not Inferior Oolite; nor does it appear that the latter formation, although so rich in the genus *Astarte*, has ever produced *A. lurida*.

XXVII.—Description of a new species of Grass Finch from New Caledonia. By JOHN MACGILLIVRAY, F.R.G.S.

To the Editors of the *Annals of Natural History*.

GENTLEMEN, Port de France, New Caledonia, May 18, 1858.

During my short residence at this portion of New Caledonia, I have had the opportunity of collecting and preparing a few specimens of birds, one of which is of sufficient interest to induce me again to become a contributor to the 'Annals and Magazine of Natural History,' by sending you a brief notice of a new Finch, which I propose to name *Poëphila Paddoni*, in honour of Capt. James Paddon,—not because he has done so much in promoting civilization among the islands of the S.W. Pacific, but because he has at all times cordially assisted Botanists and other Naturalists who, like myself, have visited his stations at Aneiteum, Tana, the Isle of Pines, and New Caledonia. This *Poëphila* interests me especially as being a member of a genus hitherto considered as exclusively Australian as *Eopsaltria*, *Tropidorhynchus*, *Ptilotis*, *Acanthiza*, and *Zosterops*, now for the first time recorded as being found in New Caledonia. The Finch in question more resembles the Australian *P. mirabilis* (of Hombr. and